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Development of banana pollen.—An extensive investigation²¹ of three races of the edible banana (*Musa sapientum*) has shown that they can be distinguished by the number of chromosomes, "*Dole*" having 8, "*Radjah Siam*" 16, and "*Kladi*" 24, as the haploid numbers, so that the races might be designated as vars. *univalens*, *bivalens*, and *trivalens*. The volume of the nuclei, but not their surfaces, is in the ratio 1:2:3. With the increase in the number of chromosomes came disturbances in the development of pollen, some of the chromosomes not passing to the poles, but remaining behind and forming extra nuclei. The size of the tetrad varies in a given anther, although the number of chromosomes in the entire tetrad is constant. Sometimes as many as eight pollen grains are formed from a single mother cell.

Prochromosomes are easily distinguished in the pollen mother cell, and in *Musa Dole* TISCHLER was able to show that the number of prochromosomes was equal to the diploid number of chromosomes. Probably there is a fusion of prochromosomes at synapsis. The splitting of chromosomes at the streptonema stage TISCHLER regards as genuine and not merely apparent.—CHARLES J. CHAMBERLAIN.

Parthenogenesis in Taraxacum.—Parthenogenesis in *Taraxacum* has been investigated again, this time by SCHKORBATOW²² who writes in Russian, but adds a summary in German, from which the following points are taken: The removal of anthers does not in any way affect the germination of seeds. Various colors of seeds, like clear green and dark brown, may become fixed and hereditary. At metaphase of the first division in the embryo sac, the chromosomes show various and characteristic forms, but the chromosomes seldom take the arrangement belonging to the heterotypic mitosis, and when they do, the author regards the phenomena as atavistic. Amitotic divisions occur in the embryo sac, in the endosperm, and in early stages of the embryo, in the last case all the nuclei but one becoming resorbed, so that the cells are left uninucleate.—CHARLES J. CHAMBERLAIN.

The origin of the vacuole.—Probably most botanists believe that the large vacuoles of plants arise by the coalescence of numerous smaller ones. A paper by BENSLEY,²³ dealing with the canalicular apparatus of animals, gives also a description of root tips and the tapetum of anthers. The fixing agent used was: neutral formalin (freshly distilled), 10 cc.; water, 90 cc.; potassium bichromate, 2.5 g.; mercuric chloride, 5.0 g. With this fixing

²¹ TISCHLER, G., Untersuchungen über die Entwicklung des Bananen-Pollens. I. Archiv. für Zellforschung 5:622-670. pls. 30, 31. 1910.

²² SCHKORBATOW, L., Parthenogenetische und apogame Entwicklung bei den Blütenpflanzen Entwicklungsgeschichtliche Studien an *Taraxacum officinale* Wigg. Bot. Institut Charkow. pp. 43. pl. 1. figs. 4. 1910.

²³ BENSLEY, R. R., On the nature of the canalicular apparatus of animal cells. Biol. Bull. 19:174-194. figs. 1-3. 1910.

agent and Haidenhain's iron alum haematoxylin, or Flemming's triple stain, the young cells, especially of the dermatogen and plerome, show an intricate network of canals, and older cells show a gradual transition from the network, which is a single structure, to the familiar appearance obtained by current methods. This method promises to solve the problem of the origin of the vacuole, and at the same time it is excellent for nuclear structures.—CHARLES J. CHAMBERLAIN.

Mitochondria.—The small bodies variously known as mitochondria, chondriosomes, chondriokonten, and chromidial substance, have been known to zoologists for some time, but it is only recently that they have attracted any serious attention among botanists. A short paper by LEWITSKI²⁴ describes the mitochondria in young cells of *Pisum sativum* and *Asparagus officinale*. In the root tip the mitochondria become transformed into leucoplasts, and in the stem tip into chloroplasts. The mitochondria divide and are believed to be an essential part of the cytoplasm. No mitochondria were found inside the nucleus, and the author does not believe that there is any passage of mitochondria between nucleus and cytoplasm. Division of mitochondria is figured and described.—CHARLES J. CHAMBERLAIN.

Origin of the plastid.—For nearly twenty years the theory that the plastid is a permanent organ of the cell, arising only by the division of a preexisting plastid, has been generally accepted, doubtless on account of the thorough investigations of SCHIMPER and of MEYER. When LEWITSKI's paper appeared, claiming that plastids arise from chondriosomes, MEYER²⁵ at once denied the claim and demanded proof. For several years the reviewer has doubted the accuracy of the conclusion reached by both SCHIMPER and MEYER that the plastid arises only by the division of a pre-existing plastid. Their evidence seems more voluminous than convincing. It is to be hoped that this incipient controversy will settle the status of the plastid.—CHARLES J. CHAMBERLAIN.

²⁴ LEWITSKI, G., Ueber die Chondriosomen in pflanzlichen Zellen. Ber. Deutsch. Bot. Gesell. **28**:538-546. *pl.* 17. 1910.

²⁵ MEYER, ARTHUR, Bemerkungen zu G. LEWITSKI: Ueber die Chondriosomen in pflanzlicher Zellen. Ber. Deutsch. Bot. Gesell. **29**:158-160. 1911.